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(54) [Title of the Invention]
Printer Apparatus
(57) [Abstract]
[Objective]
30 There are occasions that there is no sheet tray
corresponding to the designated size and designated type of
sheet. The present invention enables to continue printing

operation even in such a case.

[Solution]

When print operation is caused to start, if there is no designated size of sheet or the sheet having the designated orientation, a tray selecting part 20 looks for a sheet tray 3 including sheets having the same size and the different orientation. If there is a sheet tray 3 including sheets having the same size and the different orientation, the tray selecting part 20 selects it and an image rotating part 23 changes the orientation of the image to be printed and the rotated image is printed. If there is no such a sheet tray 3 including the sheet of the same size, the tray selecting part 20 selects the sheet tray 3 including sheets having another size, a scale processing part 24 changes the scale of the image so as to meet the sheet size, and the image is printed.

[Scope of Claims]

[Claim 1]

A printer apparatus comprising a plurality of sheet trays, characterized in that:

if there is not a sheet tray including a sheet having a designated size and a designated orientation when starting to print an image, a sheet tray including a sheet having the same size and the different orientation with respect to the designated size and orientation is looked for;

if there is another sheet tray including a sheet having the same size and the different orientation, the another sheet tray is selected and the image is printed with its orientation changed; and

if there is not a sheet tray including a sheet having the same size, a sheet tray including the another sized sheet is selected, a scale of the image is changed to meet the selected sheet size, and the scale-changed image is printed.

[Claim 2]

The printer apparatus as claimed in claim 1, wherein:

if the sheet tray is out of paper during printing, another sheet tray including the same size of sheet which has become short and having the same orientation with the sheet which has become short is looked for;

if another sheet tray including a sheet having the same size and the same orientation exists, a sheet is supplied therefrom;

10 if there is no another sheet tray including a sheet having the same size and the same orientation, a sheet tray including a sheet having the same size and the different orientation is looked for;

if another sheet tray including a sheet having the same size and the different orientation exists, a sheet is supplied therefrom, and an image is printed on the thus supplied sheet by changing an orientation of the image; and

if there is no sheet tray including a sheet having the same size, the printing operation is terminated.

20 [Claim 3]

The printer apparatus as claimed in claim 2, wherein, if the sheet tray is out of paper during printing and there is no sheet tray having the same size of sheet that has become short, a sheet is supplied from a sheet tray including a sheet of which the side is larger than that of the sheet which has become short.

[Detailed Description of the Invention]

[0001]

[Technical Field which the Invention Belongs to]

30 The present invention relates to a printer apparatus, and more specifically, relates to switching over the sheet tray when the sheet tray becomes out of paper.

[0002]

[Background Art]

In the printer apparatus having a plurality of sheet trays, it happens to occur that the designated sheet tray is out of paper. To deal with such a problem, for example, if there is a sheet of a same size in another sheet tray, another sheet tray is used by switching over the sheet tray for use. If there is no sheet tray including a same size of sheet, another sheet tray including a same size of sheet is selected and the scale of the image is changed, whereby printing on the sheet of another size
10 has been performed.

[0003]

In addition, for example, the image forming apparatus as described in a publication of Japanese Patent Laid-open Publication No. 2-121863 discloses that, if the designated tray during the printing has been short of the paper, the sheet tray including the sheet of a same size and different orientation is selected, and the image is rotated to continue printing. Furthermore, the image forming apparatus as described in the publication of Japanese Patent Laid-open Publication No. Hei
20 2-182636 includes switching a sheet tray in accordance with the previously defined priority order when paper shortage is detected.

[0004]

[Problem that the Invention is to Solve]

However, that the scale of the sheet is changed during printing to continue printing operation and/or switching a sheet tray in accordance with the previously defined priority order when paper shortage is detected as in the case of image forming apparatus as described in the publication of Japanese
30 Patent Laid-open Publication No. Hei 2-182636, causes the size of the sheet of a same document to be changed on the way of the printing.

[0005]

In addition, the image forming apparatus described in the publication of Japanese Patent Laid-open Publication No. Hei 2-121863 selects a sheet tray including a sheet having a same size and a different orientation and continues printing by rotating the image. However, the above method only cannot cope with the case where there is no designated sheet at a time of print start.

[0006]

10 The present invention is to solve such defects described above, and the objective of the present invention is to switch the sheet tray appropriately when a paper shortage is detected, and lessens the events that the printing operation is stopped.

[0007]

[Means for Solving Problem]

20 The printer apparatus according to the present invention looks for a sheet tray including a sheet having a different orientation and a same size when, at a time of print start, there is no sheet having a designated size and a designated orientation. The apparatus selects the sheet tray when it includes a sheet having the different orientation and the same size and causes the image to rotate for printing. The apparatus selects the sheet tray including a sheet having another size when there is no sheet tray including a sheet of the same size, and changes the scale of the image in accordance with the size of the sheet available, for printing. Thus, even though there is no sheet tray including the designated size of sheet, print operation can be continued.

[0008]

30 Further, if the sheet tray becomes out of paper during printing, the printer apparatus looks for another sheet tray including a sheet having the same size and the same orientation.

If there is another sheet tray including a sheet having the same size and the same orientation, the apparatus switches the sheet tray to another sheet tray. If there is no sheet tray including a sheet having the same size and the same orientation, the apparatus looks for another sheet tray including a sheet having the different orientation and the same size. If there is a sheet tray including a sheet having the different orientation and the same size, the apparatus causes to supply a sheet therefrom, causes the image to rotate, and the rotated image is printed.

10 Thus, even though the sheet becomes short during printing, a same sized sheet is caused to be supplied from another sheet tray.

[0009]

Furthermore, when the sheet tray comes to be out of paper during printing and there is no sheet tray including a same-sized sheet, the printing operation is terminated and thereby preventing the size of the sheet for printing from changing halfway of the printing operation.

[0010]

20 In addition, when the sheet tray comes to be short of the sheet during printing and another sheet tray including a sheet having the same size as that of the sheet which has been in the sheet tray, a sheet is supplied from a sheet tray including a sheet larger than that of the sheet which has been short and the printing operation is continued even without the same size of sheet.

[0011]

[Preferred Embodiment of the Invention]

30 A printer apparatus of the present invention includes a plurality of sheet trays. The printer apparatus, for example, includes a tray selecting part, a tray switching part, a scale computing part, a scale processing part and an image rotating

part. The tray selecting part looks for a sheet tray including a sheet having a different orientation and a same size when at a time of print start, there is no sheet having the designated size and the designated orientation. When a sheet tray including a sheet having the different orientation and the same size exists, the subject sheet tray is selected. When a sheet tray including the same-sized sheet does not exist, another sheet tray including the sheet having another size is selected. Here, the aforementioned designated orientation means whether
10 the sheet is set along the longitudinal direction of the tray, or along the widthwise direction of the tray. The tray switching part changes the sheet tray from which the sheet is supplied to the sheet tray selected by the tray selecting part. The tray selecting part selects the sheet tray including a sheet having another sheet size, and then, the scale computing part computes the scale of an image so that the image can be within a sheet included in the sheet tray selected by the tray selecting part. The scale processing part changes the scale of the image to be printed at a scale ratio computed by the scale computing
20 part for printing. Thus, even though there is no sheet having the designated size, the image can be printed out.

[0012]

Further, if the sheet tray becomes out of paper during printing, the tray selecting part looks for another sheet tray including a sheet having the same size and the same orientation. If there is the sheet tray that includes a sheet having the same size and the same orientation, the tray selecting part switches from the previous sheet tray to another one including the sheet having the same size and the same orientation. If there is
30 no such sheet tray that includes a sheet having the same size and the same orientation, the tray selecting part looks for another sheet tray including a sheet having the different

orientation and the same size. If there is such a sheet tray that includes the same sized sheet, the sheet selecting part selects the sheet tray. When the sheet tray selection is switched, during the printing operation, from the previous sheet tray to another one including the same sized sheet with the different orientation, the image rotating part causes the image to rotate by 90 degrees and the printing operation is continued. Accordingly, even though the sheet tray becomes out of paper during printing operation, frequency that the printing operation terminates can be reduced.

[0013]

Further, if there is no sheet tray including a sheet having the different orientation and the same size, printing operation is terminated. This may prevent the scale of the printed document from changing on the way of printing.

[0014]

In addition, if during printing operation, the sheet tray becomes out of paper and there is no sheet tray including the same sized sheet as the sheet included in the currently used sheet tray for printing, a sheet is to be supplied from the sheet tray including a size of the sheet larger than that included in the sheet tray which has been out of paper and the printing operation is continued. Since the printing is performed on the sheet larger than that of the sheet tray which has been out of paper, the sheet size can be the same by cutting to reduce the size of the sheet.

[0015]

[Embodiment]

Fig. 1 shows a configuration of a printer apparatus 1 as one embodiment of the present invention. As shown in Fig. 1, the printer apparatus 1 includes a controller 10, a panel apparatus 2, sheet trays 3a to 3n, a sheet feeder 4, and a printer

engine 5.

[0016]

The controller 10 includes a RAM 11, a font ROM 12, a program ROM 13, a non-volatile RAM 14, an IC card 15, a CPU 16, a host interface (hereinafter, to be referred to as a host I/F) 17, a panel interface (hereinafter, a panel I/F) 18, an engine interface (hereinafter, an engine I/F) 19, a tray selecting part 20, a tray switching part 21, a scale computing part 22, a scale processing part 23 and an image rotating part 24. The RAM 11
10 stores a temporary data and includes a work area for the CPU16, an input buffer, a page buffer of the print data, and a downloaded font memory area. The font ROM 12 stores a plurality of fonts. The program ROM 13 stores control programs for the controller 10. The non-volatile RAM 14 stores instructions related to modes from the panel apparatus 2. The CPU 16 entirely controls the controller 10. The host I/F 17 performs communication with the host apparatus 9 and includes a Centronics-type connector or a RS232C type connector. Here, the present apparatus may be configured to be communicated with the host apparatus 9 via
20 the network. The panel I/F 18 performs communication with the panel apparatus 2. The engine I/F 19 exchanges commands, status data, print data, and the like, with the printer engine 5.

[0017]

The tray selecting part 20 selects any of the sheet trays 3a to 3n from which a sheet is supplied for printing. The tray switching part 21 controls the sheet feeder 4 to supply a sheet from any of the sheet trays 3a to 3n selected by the tray selecting part 20. The scale computing part 22 computes a scale ratio of the image such that printing can be made on a sheet
30 supplied from any of the sheet trays 3a to 3n selected by the tray selecting part 20. The scale processing part 23 enlarges the image or makes it smaller for printing at a scale ratio

computed by the scale computing part 22. The image rotating part 24 rotates the image by 90 degrees when the orientation of the image is different from that of the sheet.

[0018]

The sheet feeder 4 supplies a sheet from any one of the sheet trays 3a to 3n in accordance with the control by the tray switching part 21, and sends it to the printer engine 5.

[0019]

10 An operation to print an image by the thus configured printer apparatus 1 will now be described with reference to a flowchart in Fig. 2.

[0020]

Upon receipt of the image data from the host apparatus 9, the printing job starts, and the tray selecting part 20 checks if there is a sheet in a designated one of the sheet trays 3a to 3n (Step S2). If there is a sheet in the designated one of the sheet trays 3a to 3n, the tray selecting part 20 selects the designated one of the sheet trays 3a to 3n, and the tray switching part 21 controls the sheet feeder 4 to cause a sheet
20 to be supplied from the one of the sheet trays 3a to 3n selected by the tray selecting part 20, to thus start printing.

[0021]

If there is no sheet in the designated one of the sheet trays 3a to 3n, the tray selecting part 20 checks information such as the size and the orientation of the sheet included in any other sheet trays 3a to 3n (Step S4). If another one of the sheet trays 3a to 3n includes a sheet having the same size and the same orientation as those of the sheet included in the designated one of the sheet trays 3a to 3n, the tray selecting
30 part selects the another one of the sheet tray 3a to 3n, and causes to continue printing (Steps S5 and S7). If there is no sheet tray, among the sheet trays 3a to 3n, that includes a sheet

having the same size and the same orientation as those of the sheet included in the designated one of the sheet trays 3a to 3n, the tray selecting part 20 looks for any one of sheet trays 3a to 3n including a sheet having the same size and the different orientation of the sheet. If there is such a sheet tray, among the sheet trays 3a to 3n, including a sheet having the same size and the different orientation, the tray selecting part 20 selects the one of the sheet trays 3a to 3n, and the image rotating part 24 rotates the image for printing by 90 degrees, to thus continue printing processing (Steps S6 and S7). Accordingly, because one of the sheet trays 3a to 3n that includes a sheet having the same size as the designated one is selected, expansion or reduction of size of the image needs not performed, thereby enabling to print the image accurately.

[0022]

If there is no sheet in the designated one of the sheet trays 3a to 3n, and there is no sheet tray, among the sheet trays 3a to 3n, including the sheet having the same size that was included in the designated one of the sheet trays 3a to 3n, the tray selecting part 20 checks whether or not the other sheet trays 3a to 3n include a sheet. If any other sheet tray among the sheet trays 3a to 3n includes a sheet (Step S9), the tray selecting part 20 selects one of the sheet trays 3a to 3n including a sheet having a size closest to that of the sheet included in the designated one of the sheet trays 3a to 3n (Step S10). The tray switching part 21 controls the sheet feeder 4 to supply a sheet from any one of the sheet trays 3a to 3n selected by the tray selecting part 20. The scale computing part 22 computes a scale ratio in accordance with the size of the sheet included in the one of the sheet trays 3a to 3n selected by the tray selecting part 20 (Step S11). The scale processing part 23 expands or reduces size of the image to be printed at an

obtained scale ratio computed by the scale computing part 22 to thus continue printing processing (Step S12). Accordingly, even though there is no sheet having the designated size, printing processing can be started.

[0023]

Thus, when the printing operation has been started and any one of the sheet trays 3a to 3n from which paper is supplied becomes out of paper (Step S2), the tray selecting part 20 looks for another sheet tray, among sheet trays 3a to 3n, which
10 includes a sheet having the same size until then the paper has been therefrom (Steps S4 to S7). If there is no such a tray, among sheet trays 3a to 3n, that includes the sheet having the same size, the printing operation is terminated due to occurrence of paper shortage error (Step S13). Accordingly, even though a paper shortage occurs during printing, a same sized sheet is supplied from another sheet tray among sheet trays 3a to 3n, and thus, that the printing operation stops can be prevented and that the sheet size changes during printing can be prevented.

20 [0024]

Meanwhile, adding information such as a number of sheets to be printed at a head of the print data sent from the host apparatus 9 and selecting any one of the sheet trays 3a to 3n including the intended number of sheets can be performed. Thus, paper shortage during the print operation can be prevented.

[0025]

In addition, when one of the sheet trays 3a to 3n is out of paper and there is no sheet tray, among sheet trays 3a to 3n, including the same sized sheet that is included in the sheet
30 tray which has become out of paper, a sheet is supplied from another sheet tray, among sheet trays 3a to 3n, that includes a sheet larger than that of the sheet that has become short,

and the printing can be continued. Printing is performed to a sheet larger than the sheet included in the sheet tray which has become out of paper, whereby, by cutting the sheet, the sheet size can be made into a same size.

[0026]

[Effect of the Invention]

As described above, the printer apparatus according to the present invention looks for a sheet tray including a sheet having a different orientation and a same size when, at a time
10 of print start, there is no sheet having the designated size and the designated orientation. The apparatus selects a sheet tray when there is a sheet tray including a sheet having the different orientation and the same size and causes the image to rotate for printing. Thus, even though there is no sheet having the designated orientation, the image can be printed on the designated size of sheet.

[0027]

Further, if there is no sheet tray including a sheet of a same size, the printer apparatus selects another sheet tray
20 including a sheet having another size, changes the scale of the image in accordance with the size of the sheet available, and prints the image. Thus, even though there is no sheet of the designated size, print operation can be performed.

[0028]

Further, if the sheet tray is out of paper during printing, the printer apparatus looks for another sheet tray including a sheet having a same size and a same orientation. If there is another sheet tray including a sheet having the same size and the same orientation, the apparatus switches to this another
30 sheet tray. If there is no sheet tray including a sheet having the same size and the same orientation, the apparatus switches the sheet tray to the one including the sheet having the same

size and the different orientation, rotates the orientation of the image, and prints the rotated image. Thus, even though the sheet becomes short during printing, the same sized sheet can be supplied from another sheet tray and printing processing can be performed.

[0029]

Furthermore, if the sheet tray comes to be short of the sheet during printing and there is no sheet tray including a same-sized sheet, the printing operation is terminated and
10 thereby preventing the size of the sheet for printing from changing on the way of the printing operation.

[0030]

In addition, when the sheet tray comes to be out of paper during printing and there is another sheet tray including a sheet having the same size as that of the sheet which has been in the previous sheet tray, a sheet is supplied from the sheet tray including the sheet larger than the size of the sheet which has been short. Thus, even though the same sized sheet is not available, the printing operation can be continued.

20 [Brief Description of Drawing]

[Fig. 1]

Fig. 1 shows a configuration of an exemplary embodiment of the present invention.

[Fig. 2]

Fig. 2 is a flowchart showing an operation of the present invention.

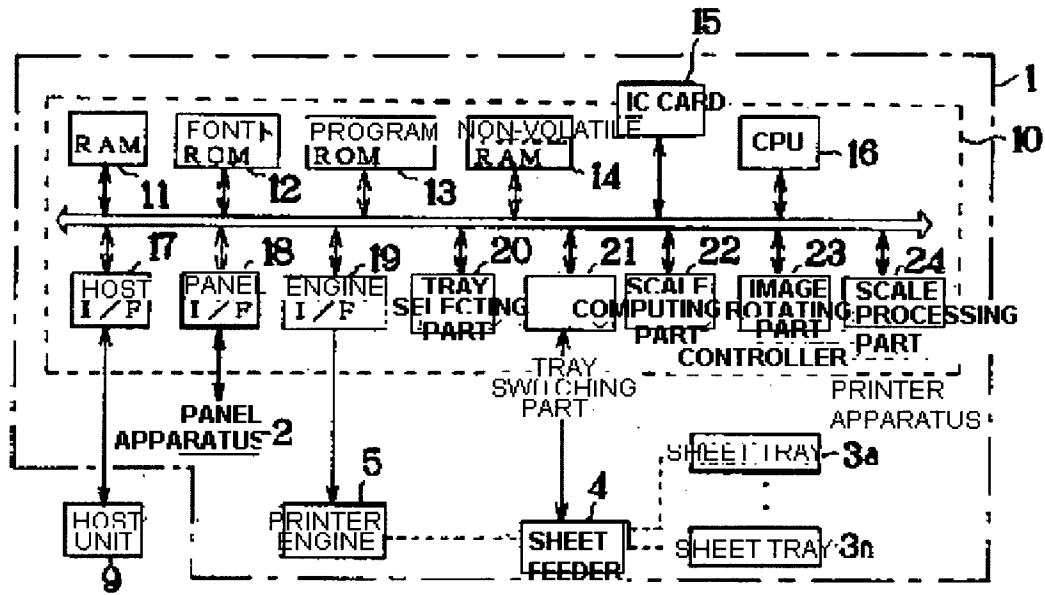
[Reference Numerals]

1	Printer apparatus
10	Controller
20	Tray selecting part
21	Tray switching part
22	Scale computing part

- 23 Scale processing part
- 24 Image rotating part
- 3 Sheet tray
- 9 Host apparatus

[Drawings]

[Fig. 1]



[Fig. 2]

